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# 5 The Working Cell

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## Objectives

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### Energy and the Cell

- 5.1 Define and compare kinetic energy, potential energy, chemical energy, and heat.
- 5.2 Define the first and second laws of thermodynamics. Explain how these laws of thermodynamics guide energy transformations.
- 5.3 Define and compare endergonic and exergonic reactions. Explain how cells use cellular respiration and energy coupling to survive.
- 5.4 Explain how ATP functions as an energy shuttle.

### How Enzymes Function

- 5.5 Explain how enzymes speed up chemical reactions.
- 5.6 Describe the structure of an enzyme-substrate interaction.
- 5.7 Explain how the cellular environment affects enzyme activity.
- 5.8 Explain how competitive and noncompetitive inhibitors alter an enzyme's activity.
- 5.8 Describe the process of feedback inhibition.
- 5.9 Explain how certain poisons, pesticides, and drugs inhibit enzymes.

### Membrane Structure and Function

- 5.10 Explain how membranes help organize the chemical activities of a cell.
- 5.11 Relate the structure of phospholipid molecules to the structure and properties of cell membranes.
- 5.12 Describe the fluid mosaic structure of cell membranes.
- 5.13 Describe the diverse functions of membrane proteins.
- 5.14 Define diffusion and describe the process of passive transport.
- 5.15 Explain how transport proteins facilitate diffusion.
- 5.16 Explain how osmosis can be considered to be the diffusion of water across a membrane.
- 5.17 Distinguish among hypertonic, hypotonic, and isotonic solutions.
- 5.17 Explain how plant and animal cells change when placed into hypertonic or hypotonic solutions.
- 5.15, 5.18 Compare the processes of facilitated diffusion and active transport.
- 5.19 Distinguish among exocytosis, endocytosis, phagocytosis, pinocytosis, and receptor-mediated endocytosis.
- 5.21 Describe the central role of chloroplasts and mitochondria in harvesting energy and making it available for cellular work